CAMP

Design for a Street Railway Car Barn

Civil Engineering
B. S.
1905

DESIGN

FOR A

STREET RAILWAY CAR BARN

BY

CARA LOUIS CAMP

THESIS

FOR

DEGREE OF BACHELOR OF SCIENCE

IN

CIVIL ENGINEERING

COLLEGE OF ENGINEERING

UNIVERSITY OF ILLINOIS

PRESENTED JUNE 1905

UNIVERSITY OF ILLINOIS

May 19, 1905

This is to certify that the thesis prepared under the immediate supervision of Instructor C. W. Malcolm by

CARA LOUIS CAMP

entitled DESIGN FOR A STREET-RAILWAY CAR BARN

is approved by me as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering

Ira O. Baker

Head of Department of Civil Engineering

DESIGN
FOR A
STREET RAILWAY CAR BARN.

INTRODUCTION.

In the spring of 1904 it was proposed by the Springfield Consolidated Railway Company, of Springfield, Illinois, to build a combined car barn and office building. An old power station was remodeled, however, and is now used for that purpose. The building is near the business portion of the city, and would yield a greater income if put to some other use; while a car barn farther out would be of as much value to the Company, and would cost less to maintain. In consideration of these facts, the writer has chosen the design of such a structure for his thesis.

This thesis will consist of a general description of the building, an estimate of the cost, and the following drawings:-

(1) Stress Sheet for Roof Truss,

(2) Details of Roof Truss.

(3) Plans and Elevations.

The steel work will be designed according to the specifications in Ketchum's "Steel Mill Buildings." Cambria's Hand-book will be used for the properties of all sections.

DESCRIPTION.

The building will be of brick, 92 ft. by 306 ft. outside dimensions, and will be covered with a four-ply felt and gravel roof. It will be divided into three sections; the barn proper, the shops and storeroom, and the offices.

The barn proper will be 76 ft. by 306 ft. The walls will be 8 inches thick and 18 ft. high, and will support steel roof-trusses by pilasters 18 inches square. These pilasters will be 16 ft. center to center and 16 ft. high. The roof trusses will be of the Fink type, with a span of 75 ft., and a pitch of 1/4. The front of the barn will contain six double doors 16 ft. by 10 ft., the wall above resting on two 7-inch I beams supported by brick piers two ft. square. The barn will contain six par-

allel tracks, 12 ft. center to center, running lengthwise of the building

The shops and store-room will be 16 ft. by 225 ft. with 8-inch walls, and will be built at the side of the barn as shown in Drawing Number 3. This section will contain the storeroom, the sand room, and the shops.

The section containing the offices will be two stories high, 16 ft. by 81 ft., the first story to be twelve ft. high, the second 10 ft., with walls 12 inches and 8 inches, respectively. The first floor will contain the general offices, and the second will be occupied by the employees.

ESTIMATE OF COST.

An estimate of the cost of the building will be made to accompany the design. All estimates for steel work will be made according to data given in Ketchum's "Steel Mill Buildings". Estimates for all other work will be made on prices quoted by Prof. J. M. White, of the Department of Architecture. The brick work will be estimated according to the "Rules of Measurement" adopted by the Chicago Masons and Builders Association.

ESTIMATE OF WEIGHT.

No. of Pieces.	Shape.	Section.	Length Ft.	Length In.	Wt. lb. per ft.	Weight Main Members	Weight Details	Details % of Main Members	Total Weight.
18	Trusses each	thus.							
4	∠s	5"×3"×⅜"	41	11½	9.8	1644			
4	∠s	3½"×3½"×7/16"	23	11¾	9.8	940			
4	∠s	3"×3"×¼"	27	0½	4.9	530			
8	∠s	2½"×2"×¼"	2	1¼	3.7	63			
16	∠s	2½"×2"×¼"	4	11½	3.7	294			
8	∠s	3½"×2½"×¼"	9	11½	4.9	390			
8	∠s	2½"×2"×¼"	10	9	3.7	318			
4	∠s	3"×3"×¼"	22	6	4.9	351			
1	∠s	2½"×2"×¼"	18	0	3.7	67			
4	∠s	2½"×2"×¼"	5	3	3.7	122			
2	∠s	2½"×2"×¼"	4	5	3.7	33			
1	∠	2½"×2"×¼"	3	11	3.7	15			
4	∠s	2½"×2"×¼"	4	8¼	3.7	91			
2	Plates	27"×⅜"	1	8½	34.44		72		
7	"	6"×⅜"	0	10½	7.65		47		
4	"	12"×⅜"	1	9½	15.30		107		
2	"	17"×⅜"	2	11	21.68		127		
1	"	25½"×⅜"	4	1	32.52		133		
4	"	8"×⅜"	0	9	10.20		31		

ESTIMATE OF WEIGHT. (Concl.)

No. of Pieces	Shape	Section	Length Ft.	Length In.	Wt. lb. per ft.	Weight Main Members	Weight Details	Details % of Main Members	Total Weight.
2	Plates	7"×⅜"	0	11½	8.93		9		
2	"	14"×⅜"	1	5½	17.86		53		
2	"	17"×⅜"	2	7	21.68		112		
2	"	11½"×⅜"	1	0½	14.68		29		
2	"	9"×⅜"	0	8	11.48		15		
2	"	18"×⅜"	0	8	22.95		30		
2	"	10"×⅜"	0	10	12.75		21		
1	"	8½"×⅜"	0	11	10.84		10		
1	"	12"×⅜"	1	0	15.30		15		
460		⅝" Rivet Heads			9.95	per 100	46		
		Total		1 Truss		4858	857	17.2	5715
		"		18 Trusses					102870
			PURLINS.						
380	[s	6"	16	0	12.25	74480			
360	L	5"×3½"×⅜"	0	10⅜	9.8		3159	4.2	77639
			CRANE GIRDER.						
38	Is	8"	16	0	18	10944			10944
			BOTTOM CHORD STIFFNERS.						
34	Ls	3½"×2½"×¼"	16	0	4.9	2665			2665
	Total Steel Work					175523	18585	15.9	194118

ESTIMATE OF COST OF STEEL WORK

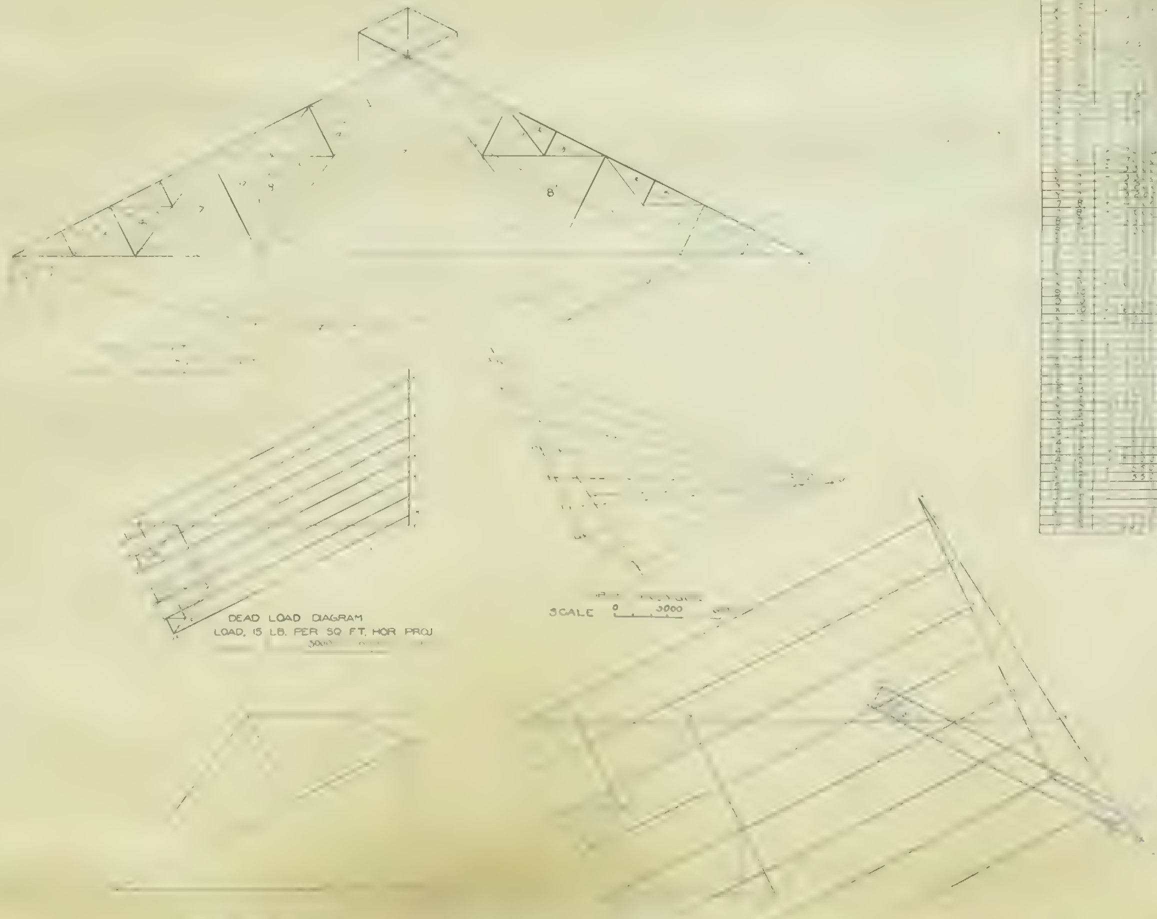
Classification of Material	Weight lb.	Cost of Material		Cost of Labor	
		Price	Amount	Price	Amount
Riveted Trusses	102870	¢ 1.6	$ 1645.92	¢ 1.00	1028.70
I Beam Girders	10944	1.65	180.58	.25	26.86
L Bracing	2665	1.6	42.64	.25	6.66
[Purlins	77639	1.6	1242.22	.15	116.45
Totals.	194118		3111.36		1178.67

SUMMARY

Cost of Material		$ 3111.36
Cost of Shop Labor		1178.67
Cost of Details	87 T. @ $ 3.60	313.20
Cost of Shop Painting		116.00
Total Shop Cost		4719.23
Freight, Mill to Shop	87T @ 4.40	382.80
Freight, Shop to Site	87T @ 1.00	87.00
Erection, Structural	87T @ 8.00	696.00
Painting		60.00
Total Cost of Steel Work		5945.03

ESTIMATE OF COST OF BUILDING.

Ref No.	Kind of Work	Amount	Unit Price	Total Cost.
1	Steel Work	See page 7		$ 5945.
2	Brick Walls	494300 Brk	$ 10.50 per M.	5189.
3	Brick Floors	101300 "	10.50 " M.	1064
4	Composition Roof	30600 sq. ft.	.04 " sq. ft.	1224
5	Rafters and Sheathing	30600 " "	.06 " " "	1836.
6	Wooden Floors	6176 " "	.12 " " "	741.
7	Partitions	1536 " "	.025 " " "	39.
8	Windows	5095 " "	.75 " " "	3821.
9	Doors	1632 " "	.75 " " "	1224.
10	Plastering	893 " yd.	.25 " yd.	224
11	Copper	3600 " ft.	.40 " ft.	1440.
12	Stairway			50
13	Base Board	576 ft.	.10 per. ft.	58
14			Total	23855
14.	Miscellaneous	15% total	cost.	3428
	Cost of Building			26283.



DEAD LOAD DIAGRAM
LOAD, 15 LB. PER SQ. FT. HOR. PROJ.

SCALE 0 3000

Member	Dead Load	Max Snow	Wind Load	Crane Load	Wind [illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	700	0	− 7400	− 14100
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

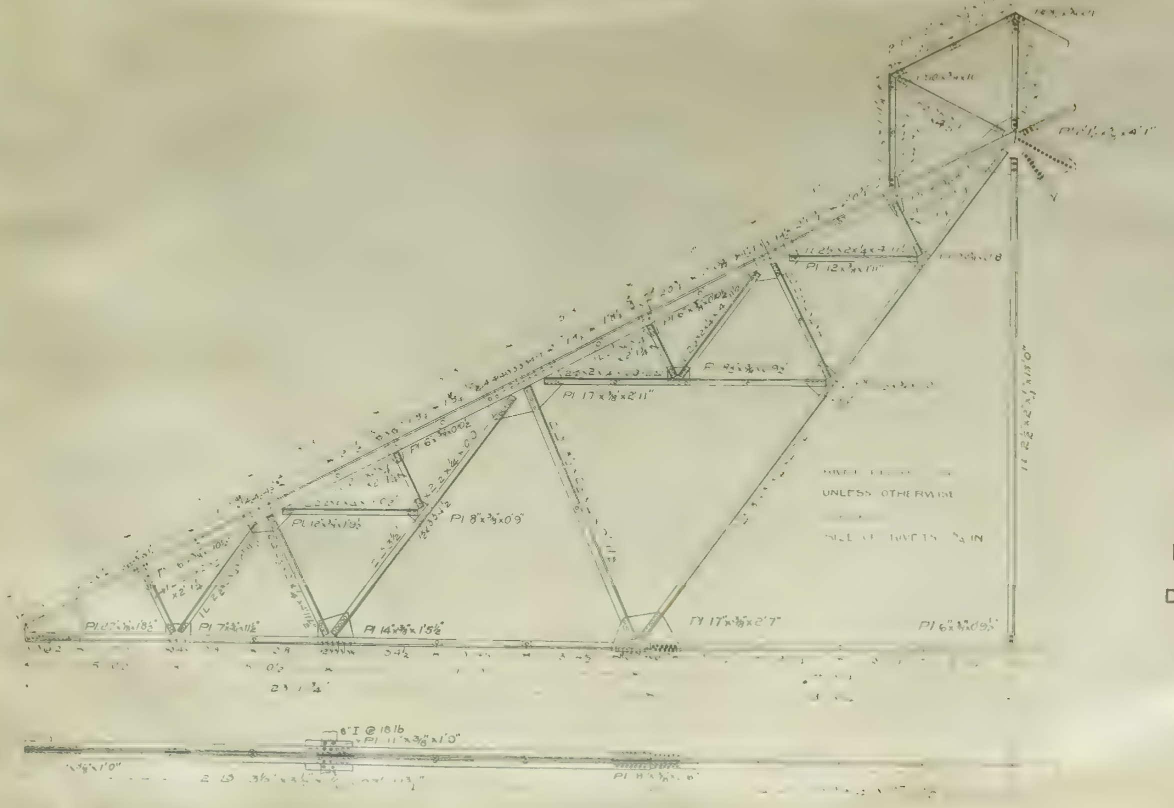
DESIGN OF CAR BARN

STRESS SHEET FOR ROOF [illegible]

C. L. Camp

UNIVERSITY OF ILLINOIS. MAY 7 [illegible]

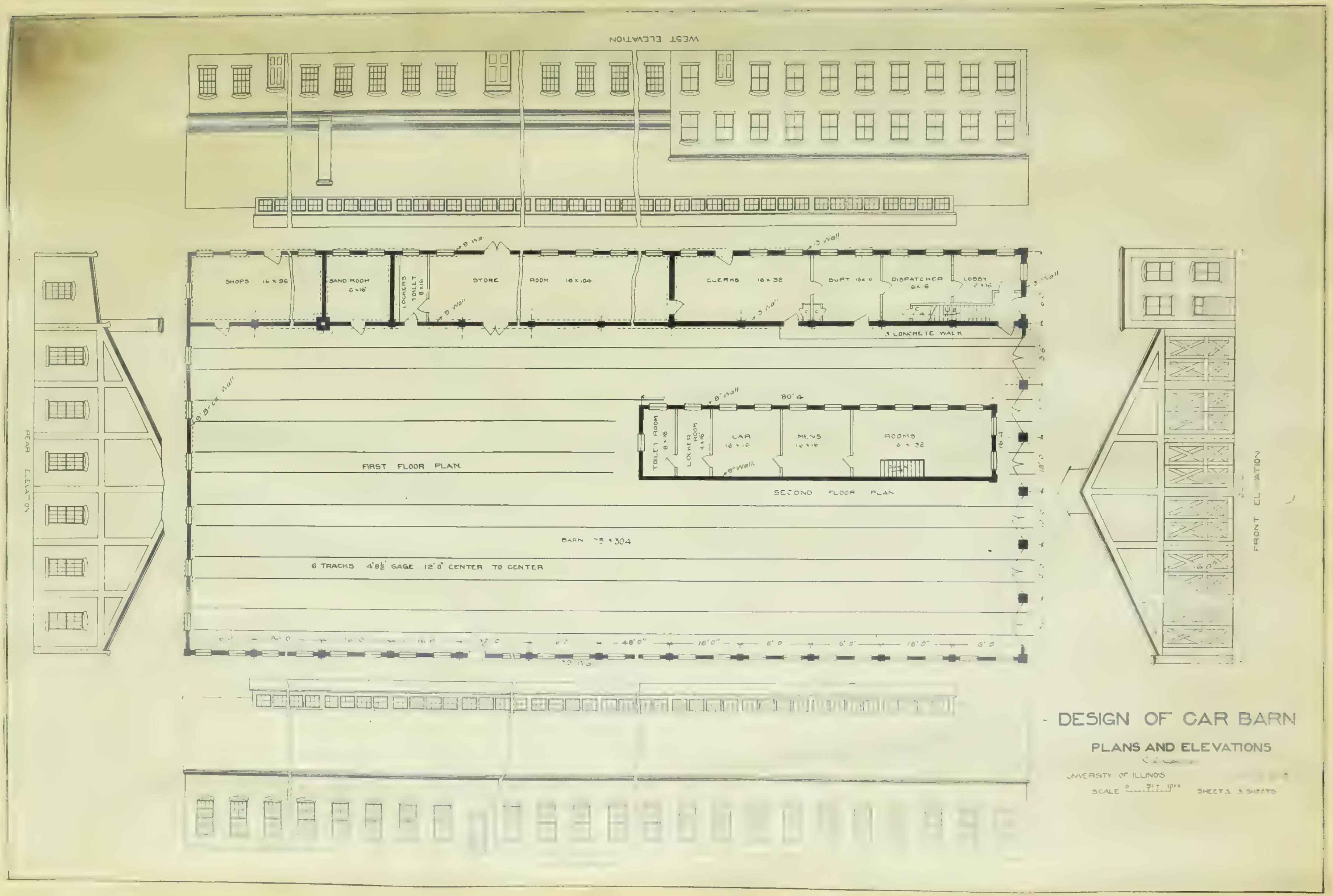
SHEET 1 [illegible]



DESIGN OF CAR BARN

DETAILS OF ROOF TRUSS

SCALE SHEET 2



DESIGN OF CAR BARN

PLANS AND ELEVATIONS

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SCALE 0 5 FT 10 FT SHEET 3 3 SHEETS